Reference No. M&G 4163.918-US-ZB
Job No. TOT-MERC-2004

19. Japan Patent Office (JP) 11. Patent Application Laid-open No.

12. Japan Laid-open Patent Gazette (A) Heisei 2-55794 (1990)

51. Int. Cl.[5]	ID Code	Internal Reference No.	43. Patent Laid-open Date: February 26, 1990 (Heisei 2)
C 10 M 173/02		8217-4H*	Place for Technology Labeling

Request for Examination: Attached / Not Requested | Number of Claims: 1 | (Total 4 pages)

54. Title of Invention	**Antimicrobial lubricant composition**
21. Application No.	Showa 63-207536
22. Date of Filing	August 22, 1988 (Showa 63)
72. Inventor	Kenji Miura 51-113, Masuo, Kashiwa-shi, Chiba-ken
72. Inventor	Kaname[1] Sakai 6-30, Osonedai, Kohoku-ku, Yokohama-shi, Kanagawa-ken
72. Inventor	Mikinobu Tamura Asahi-Ryo, 8-46-21, Higashi-Oku, Arakawa-ku, Tokyo
71. Applicant	Asahi Denkakogyo K.K. 7-2-35, Higashi-Oku, Arakawa-ku, Tokyo
74. Agent	Hajime[2] Furuya

1. Title of the invention

Antimicrobial lubricant composition

2. Patent Claims

An antimicrobial lubricant composition, characterized by containing 0.1-50 wt% of one or more types of surfactant selected from a group comprising cationic surfactants and amphoteric surfactants, and 1-80 wt% of a fatty acid salt with 6-10 carbons.

3. Detailed explanation of the invention

(Field of industrial application)

The present invention pertains to a novel antimicrobial lubricant composition. In particular, the present invention concerns an antimicrobial lubricant composition for conveyor belts which has the objective of eliminating the dangers of food contamination by harmful bacteria, and the composition also decreases the frictional forces between conveyor belts and cans or bottles used in the milk, beer, sake and liquid refreshment industries.

---

[1] ILS Note - An alternative way of reading this name is "You"
[2] ILS Note - An alternative way of reading this name is "Tadashi"

(Prior art and problems to be solved by the invention)
Bottles and cans are transported using conveyor belts in the food and beverage industry, particularly in the milk, beer, sake and liquid refreshment industries. A lubricant is generally used to decrease the frictional forces between the bottles or cans and the conveyor belt, and examples of such lubricants used in the past are substances having sodium, potassium or alkanolamine salts of unsaturated fatty acids with 12-22 carbons as the primary component, and other added materials which include nonionic surfactants, metal ion chelators, and solvents.

In the food and beverage packing processes carried out in the manufacture of these food products, considerations are made in carrying out processes such as packing in antiseptic rooms so as to prevent contamination with harmful bacteria from the environment. However, because there is the danger that harmful bacteria will propagate on conveyors by using food spills and dilute lubricant solution as nutrients, a lubricant with excellent antimicrobial properties is desired. Lubricants containing antimicrobial agents have recently appeared on the market, but these products have had only bacteriostatic-level effects. Currently, these compositions are not able to completely eradicate microorganisms on conveyors. Although sufficient effects from the standpoint of bactericidal properties have been obtained when amphoteric or cationic surfactants such as quaternary ammonium salts have been used as antimicrobial agents, sufficient effects have not been obtained in terms of decreasing the forces of dynamic friction between the bottles or cans and the conveyor. It is well known that the best means for decreasing forces of dynamic friction is the use of sodium, potassium or alkanolamine salts of saturated or unsaturated fatty acids with 12-22 carbons. However, when these fatty acid salts and cationic surfactants are used in conjunction, insoluble compounds are formed which decreases the antimicrobial effectiveness of the composition or lowers its lubricating ability. Similarly, a decrease in antimicrobial effectiveness is seen when the aforementioned fatty acid salts are mixed with amphoteric surfactants.

A lubricant that is endowed with both antimicrobial and lubricating abilities has not been attained heretofore, thus the objective of the present invention is to offer a lubricant with both antimicrobial and lubricating abilities.

(Means to solve the problems)
The inventors of the present invention arrived at the present invention as a result of painstaking investigations towards obtaining an antimicrobial lubricant composition that has excellent effects in terms of reducing forces of dynamic friction, specifically, lubricating abilities, and can also completely eradicate microorganisms present on conveyors.

Specifically, the antimicrobial lubricant composition of the present invention is characterized by containing 0.1-50 wt% of one or more types of surfactant selected from a group comprising cationic surfactants and amphoteric surfactants, and 1-80 wt% of a fatty acid salt with 6-10 carbons.

Surprisingly, the lubricant composition of the present invention does not form insoluble compositions and has excellent lubricating and antimicrobial properties, despite the fact that a conventional anionic surfactant (fatty acid salt) is mixed with a cationic surfactant or amphoteric surfactant.

Details concerning the lubricant composition of the present invention are presented below.

Examples of substances that are preferred for use as the cationic surfactant used in the present invention include benzalkonium chloride, tetraalkylammonium chloride, benzethonium salts, alkylpyridinium salts and other types of cationic surfactants that have antimicrobial activity, specific examples of which include lauryldimethylammonium chloride, didecyldimethylammonium chloride, 1-hexadecylpyridinium chloride and cetyldimethylethylammonium[3] bromide. In addition, examples of preferred amphoteric surfactants include glycine-type amphoteric surfactants such as N-alkyldiaminoethylglycine salts having antimicrobial activity. One or more types of surfactant selected from a group of these cationic surfactants and amphoteric surfactants is blended in the lubricant composition in the amount of 0.1-50 wt%, with 1-20 wt% being preferred. Amounts that are 0.1 wt% or less do not provide good antimicrobial power, whereas amounts in excess of 50 wt% do not provide sufficient reduction of dynamic friction.

Examples of saturated or unsaturated fatty acid salts with 6-10 carbons used in the present invention include sodium, potassium, alkanolamine and ammonium salts of caproic acid, caprylic acid and capric acid. These fatty acid salts are blended in the lubricant composition in the amount of 1-80 wt%, with 5-50 wt% being preferred. At amounts that are less than 1 wt%, the reduction in dynamic friction will be inadequate, whereas amounts that are in excess of 80 wt% will make it difficult to maintain the product in liquid form, and will provide no further decrease in dynamic friction.

In addition, it is within the scope of the present invention for the lubricant composition to also contain, as necessary, water, alcohol, ether, or other solvents, ethylenediaminetetraacetates or other metal ion chelators, or nonionic surfactants.

The lubricant composition of the present invention is diluted by an appropriate factor at the time of use in accordance with the conveyor speed, the type of bottles or cans, and the type of conveyor belt.

(Effect of the invention)
The antimicrobial lubricant composition of the present invention contains a fatty acid salt with a carbon number of 6-10 and a cationic surfactant and/or amphoteric surfactant. The composition is a completely novel antimicrobial lubricant composition whereby the high levels of antimicrobial property provided by these components and the high level of lubricating property provided by the fatty acid salt can be manifested without the formation of insoluble compounds.

(Embodiments)
The present invention is described in additional detail below by providing embodiments, but is not limited to these embodiments.

Embodiments 1-10, Comparative Examples 1-6
The various lubricant compositions produced by blending the components shown in Table 1 were prepared, and the lubricating property, antimicrobial property and product stability of the compositions were tested according to the methods described below.

The results are shown in Table 2. In terms of product stability, fluidity was not obtained with Comparative Example 4, but the other products were stable.

---

[3] ILS Note - sic. Phonetic translation.

Test methods

1) Lubricating power

The forces (weight) acting on a load (beer bottles) on a chain conveyor were measured with a spring balance, and the frictional resistance was determined.

Conditions
Dilution factor: 100x
Conveyor speed: 32 m/min
Conveyor material: plastic
Hardness of diluent water: about 80 ppm ($CaCO_3$)
Bottle weight: 1250 g

2) Antimicrobial effectiveness

Test bacteria
Escherichia coli, Bacillus subtilis, Pseudomonas aeruginosa, Streptococcus faecalis
Dilution factor: 150x

Test method

1.0 mL of each of the test bacteria dilutions was added to 100 mL of diluted lubricant solution, and after a certain period of time, 1.0 mL amounts were used for inoculation of an ordinary agar medium. A determination was made after incubation for 48 h.
+: Denotes live bacteria
-: Denotes killing of bacteria

3) Product stability

100 cc of lubricant composition product was stored for 24 h in an incubator at -58C, and any change in external appearance was observed.

Table legends (see numbered original)

Table 1

1 (parts by weight)
2 Embodiments
3 Comparative examples
4 Potassium caproate
Caprylic acid monoethanolamine salt
Capric acid triethanolamine salt
5 Lauric acid monoethanolamine salt
Potassium oleate
6 Lauryldimethylammonium chloride
Didecyldimethylammonium chloride
1-Hexadecylpyridinium chloride
Cetyldimethylethylammonium[4] chloride
N-alkyldiaminoethylglycine (Godschmidt Tego-51)
7 Polyoxyethyleneglycol oleate
(Adeka Estol DEG-106, manufactured by Asahi Denka)
Tetrasodium ethylenediaminetetraacetate
Isopropyl alcohol
Tap water
8 Total
9 Remainder

Table 2

1 Embodiments
2 Comparative examples
3 Frictional resistance
4 Antimicrobial effectiveness

[4] ILS Note - See Note 3.